

# SEQUENCE LISTING

<110> Novozymes A/S

<120> CGTASE VARIANTS

<130> 10340-WO

<160> 20

<170> PatentIn version 3.4

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<211> 713

<212> PRT

<213> Bacillus agaradherens

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Asn Ala Gln Gln Ala Thr Asp Arg Ser Asn Ser Val Asn Tyr Ser Thr  
35 40 45

Asp Gly Ile Tyr Gln Ile Val Thr Asp Arg Phe Tyr Asp Gly Asp Glu  
50 55 60

Ser Asn Asn Pro Ser Gly Glu Leu Tyr Ser Glu Gly Cys Lys Asn Leu  
65 70 75 80

Arg Lys Tyr Cys Gly Gly Asp Trp Gln Gly Ile Ile Asp Lys Ile Asp  
85 90 95

Asp Gly Tyr Leu Thr Asn Met Gly Val Thr Ala Leu Trp Ile Ser Pro  
100 105 110

Pro Val Glu Asn Ile Phe Glu Thr Ile Asp Asp Glu Ser Gly Thr Thr  
115 120 125

Ser Tyr His Gly Tyr Trp Ala Arg Asp Tyr Lys Lys Thr Asn Pro Phe  
130 135 140

Phe Gly Ser Thr Glu Asp Phe Glu Arg Leu Ile Glu Thr Ala His Ser  
145 150 155 160

His Asp Ile Lys Ile Val Ile Asp Leu Ala Pro Asn His Thr Ser Pro  
165 170 175

Ala Asp Phe Asp Asn Pro Asn Tyr Ala Glu Asn Gly Ile Leu Tyr Asp  
180 185 190

Asn Gly Asn Tyr Val Ser Ser Tyr Ser Asp Asn Ser Asp Leu Phe Leu  
195 200 205

Tyr Asn Gly Gly Thr Asp Phe Ser Thr Tyr Glu Asp Glu Ile Tyr Arg  
210 215 220

Asn Leu Phe Asp Leu Ala Ser Phe Asn His Ile Asn Ala Glu Leu Asn  
225 230 235 240

Asn Tyr Leu Glu Asp Ala Val Lys Lys Trp Leu Asp Leu Gly Ile Asp  
245 250 255

Gly Ile Arg Ile Asp Ala Val Ala His Met Pro Pro Gly Trp Gln Lys  
260 265 270

Ala Tyr Met Asp Thr Ile Tyr Asp His Arg Ala Val Phe Thr Phe Gly  
275 280 285

Glu Trp Phe Thr Gly Pro Tyr Gly Asn Glu Asp Tyr Thr Lys Phe Ala  
290 295 300

Asn Asn Ser Gly Met Ser Val Leu Asp Phe Arg Phe Ala Gln Thr Thr  
305 310 315 320

Arg Asn Val Ile Gly Asn Asn Asn Gly Thr Met Tyr Asp Ile Glu Lys  
325 330 335

Met Leu Thr Asp Thr Glu Asn Asp Tyr Asp Arg Pro Gln Asp Gln Val  
340 345 350

Thr Phe Leu Asp Asn His Asp Met Ser Arg Phe Thr Asn Asp Gly Glu  
355 360 365

Ser Thr Arg Thr Thr Asp Ile Gly Leu Ala Leu Met Leu Thr Ser Arg  
370 375 380

Gly Val Pro Thr Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Glu Gly Asp  
385 390 395 400

Gly Asp Pro Gly Ser Arg Gly Met Met Glu Ser Phe Gly Glu Asn Thr  
405 410 415

Asp Ala Tyr Lys Leu Ile Gln Lys Leu Ala Pro Leu Arg Lys Ser Asn  
420 425 430

Pro Ala Tyr Gly Tyr Gly Thr Thr Lys Glu Arg Trp Ile Asn Asp Asp  
435 440 445

Val Ile Ile Tyr Glu Arg Asn Phe Gly Asp Asn Tyr Ala Leu Ile Ala  
450 455 460

Ile Asn Arg Asn Leu Asn Thr Ser Tyr Asn Ile Gln Gly Leu Gln Thr  
465 470 475 480

Glu Met Pro Ser Asn Ser Tyr Asp Asp Val Leu Asp Gly Leu Leu Asp  
485 490 495

Gly Gln Ser Ile Val Val Asp Asn Asn Gly Glu Val Asn Glu Phe Gln  
500 505 510

Met Ser Pro Gly Glu Val Gly Val Trp Glu Phe Glu Ala Thr Asn Val  
515 520 525

Asp Lys Pro Ser Ile Gly Gln Val Gly Pro Ile Ile Gly Glu Ala Gly  
530 535 540

Arg Thr Val Thr Ile Ser Gly Glu Gly Phe Gly Ser Ser Pro Gly Thr  
545 550 555 560

Val Gln Phe Gly Ser Thr Ser Ala Glu Ile Val Ser Trp Asn Asp Thr  
565 570 575

Val Ile Ile Ile Thr Val Pro Asn Asn Glu Ala Gly Tyr His Asp Ile  
580 585 590

Thr Val Val Thr Glu Asp Glu Gln Val Ser Asn Ala Tyr Glu Phe Glu  
595 600 605

Val Leu Thr Ala Asp Gln Val Thr Val Arg Phe Ile Ile Asp Asn Ala  
610 615 620

Glu Thr Lys Met Gly Glu Asn Ile Phe Leu Val Gly Asn Val His Glu  
625 630 635 640

Leu Gly Asn Trp Asp Pro Glu Gln Ser Val Gly Arg Phe Phe Asn Gln  
645 650 655

Val Val Tyr Gln Tyr Pro Thr Trp Tyr Tyr Asp Val Asn Val Pro Ala  
660 665 670

Asn Thr Asp Leu Glu Phe Lys Phe Ile Lys Ile Asp Gln Asp Asn Asn  
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Gly Thr Gly Ile Ile Arg Val Asp Trp  
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<213> Bacillus agaradherens

<400> 2

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Ser Ala Gln Gln Ala Thr Asp Arg Ser Asn Ser Val Asn Tyr Ser Thr  
35 40 45

Asp Val Ile Tyr Gln Ile Val Thr Asp Arg Phe Tyr Asp Gly Asp Glu  
50 55 60

Ser Asn Asn Pro Ser Gly Glu Leu Tyr Ser Glu Asp Cys Lys Asn Leu  
65 70 75 80

Arg Lys Tyr Cys Gly Gly Asp Trp Gln Gly Ile Ile Asp Lys Ile Asp  
85 90 95

Asp Gly Tyr Leu Thr Asn Met Gly Val Thr Ala Leu Trp Ile Ser Pro  
100 105 110

Pro Val Glu Asn Ile Phe Glu Thr Ile Asp Asp Glu Phe Gly Thr Thr  
115 120 125

Ser Tyr His Gly Tyr Trp Ala Arg Asp Tyr Lys Lys Thr Asn Pro Phe  
130 135 140

Phe Gly Ser Thr Glu Asp Phe Glu Arg Leu Ile Glu Thr Ala His Ser  
145 150 155 160

His Asp Ile Lys Ile Val Ile Asp Leu Ala Pro Asn His Thr Ser Pro  
165 170 175

Ala Asp Phe Asp Asn Pro Asp Tyr Ala Glu Asn Gly Val Leu Tyr Asp  
180 185 190

Asp Gly Asn Tyr Leu Gly Ser Tyr Ser Asp Asp Ser Asp Leu Phe Leu  
195 200 205

Tyr Asn Gly Gly Thr Asp Phe Ser Asn Tyr Glu Asp Glu Ile Tyr Arg  
210 215 220

Asn Leu Phe Asp Leu Ala Ser Phe Asn His Ile Asn Ser Glu Leu Asn  
225 230 235 240

Asn Tyr Leu Glu Asp Ala Val Lys Lys Trp Leu Asp Leu Gly Ile Asp  
245 250 255

Gly Ile Arg Ile Asp Ala Val Ala His Met Pro Pro Gly Trp Lys Lys  
260 265 270

Ala Tyr Met Asp Thr Ile Tyr Asp His Arg Ala Val Phe Thr Phe Gly  
275 280 285

Glu Trp Phe Thr Gly Pro Ser Gly Asn Glu Asp Tyr Thr Lys Phe Ala  
290 295 300

Asn Asn Ser Gly Met Ser Val Leu Asp Phe Arg Phe Ala Gln Thr Thr  
305 310 315 320

Arg Asn Val Ile Gly Asn Asn Asn Gly Thr Met Tyr Asp Ile Glu Lys  
325 330 335

Met Leu Thr Asp Thr Glu Asn Asp Tyr Asp Arg Pro Gln Asp Gln Val  
340 345 350

Thr Phe Leu Asp Asn His Asp Met Ser Arg Phe Thr Asn Gly Gly Glu  
355 360 365

Ser Thr Arg Thr Thr Asp Ile Gly Leu Ala Leu Met Leu Thr Ser Arg  
370 375 380

Gly Val Pro Thr Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Lys Gly Asp  
385 390 395 400

Gly Asp Pro Gly Ser Arg Gly Met Met Ala Ser Phe Asp Glu Asn Thr  
405 410 415

Asp Ala Tyr Lys Leu Ile Gln Lys Leu Ala Pro Leu Arg Lys Ser Asn  
420 425 430

Pro Ala Tyr Gly Tyr Gly Thr Thr Thr Glu Arg Trp Ile Asn Asp Asp  
435 440 445

Val Leu Ile Tyr Glu Arg His Phe Gly Glu Asn Tyr Ala Leu Ile Ala  
450 455 460

Ile Asn Arg Ser Leu Asn Thr Ser Tyr Asn Ile Gln Gly Leu Gln Thr  
465 470 475 480

Glu Met Pro Ser Asn Ser Tyr Asp Asp Val Leu Asp Gly Leu Leu Asp  
485 490 495

Gly Gln Ser Ile Val Val Asp Asn Lys Gly Gly Val Asn Glu Phe Gln  
500 505 510

Met Ser Pro Gly Glu Val Ser Val Trp Glu Phe Glu Ala Glu Asn Val  
515 520 525

Asp Lys Pro Ser Ile Gly Gln Val Gly Pro Ile Ile Gly Glu Ala Gly  
530 535 540

Arg Thr Val Thr Ile Ser Gly Glu Gly Phe Gly Ser Ser Gln Gly Thr  
545 550 555 560

Val His Phe Gly Ser Thr Ser Ala Glu Ile Leu Ser Trp Asn Asp Thr  
565 570 575

Ile Ile Thr Leu Thr Val Pro Asn Asn Glu Ala Gly Tyr His Asp Ile  
580 585 590

Thr Val Val Thr Glu Asp Glu Gln Val Ser Asn Ala Tyr Glu Phe Glu  
595 600 605

Val Leu Thr Ala Asp Gln Val Thr Val Arg Phe Ile Ile Asp Asn Ala  
610 615 620

Glu Thr Lys Leu Gly Glu Asn Val Phe Leu Val Gly Asn Val His Glu  
625 630 635 640

Leu Gly Asn Trp Asp Pro Glu Gln Ser Val Gly Arg Phe Phe Asn Gln  
645 650 655

Ile Val Tyr Gln Tyr Pro Thr Trp Tyr Tyr Asp Val Asn Val Pro Ala  
660 665 670

Asn Thr Asp Leu Glu Phe Lys Phe Ile Lys Ile Asp Gln Asp Asn Asn  
675 680 685

Val Ile Trp Gln Ser Gly Ala Asn Gln Thr Tyr Ser Ser Pro Glu Ser  
690 695 700

Gly Thr Gly Ile Ile Arg Val Asp Trp  
705 710

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35 40 45

Thr Asp Arg Phe Ala Asp Gly Asp Arg Thr Asn Asn Pro Ala Gly Asp  
50 55 60

Ala Phe Ser Gly Asp Arg Ser Asn Leu Lys Leu Tyr Phe Gly Gly Asp  
65 70 75 80

Trp Gln Gly Ile Ile Asp Lys Ile Asn Asp Gly Tyr Leu Thr Gly Met  
85 90 95

Gly Val Thr Ala Leu Trp Ile Ser Gln Pro Val Glu Asn Ile Thr Ser  
100 105 110

Val Ile Lys Tyr Ser Gly Val Asn Asn Thr Ser Tyr His Gly Tyr Trp  
115 120 125

Ala Arg Asp Phe Lys Gln Thr Asn Asp Ala Phe Gly Asp Phe Ala Asp  
130 135 140

Phe Gln Asn Leu Ile Asp Thr Ala His Ala His Asn Ile Lys Val Val  
145 150 155 160

Ile Asp Phe Ala Pro Asn His Thr Ser Pro Ala Asp Arg Asp Asn Pro  
165 170 175

Gly Phe Ala Glu Asn Gly Gly Met Tyr Asp Asn Gly Ser Leu Leu Gly  
180 185 190

Ala Tyr Ser Asn Asp Thr Ala Gly Leu Phe His His Asn Gly Gly Thr  
195 200 205

Asp Phe Ser Thr Ile Glu Asp Gly Ile Tyr Lys Asn Leu Tyr Asp Leu  
210 215 220

Ala Asp Ile Asn His Asn Asn Asn Ala Met Asp Ala Tyr Phe Lys Ser  
225 230 235 240

Ala Ile Asp Leu Trp Leu Gly Met Gly Val Asp Gly Ile Arg Phe Asp  
245 250 255



Ala Val Lys His Met Pro Phe Gly Trp Gln Lys Ser Phe Val Ser Ser  
260 265 270

Ile Tyr Gly Gly Asp His Pro Val Phe Thr Phe Gly Glu Trp Tyr Leu  
275 280 285

Gly Ala Asp Gln Thr Asp Gly Asp Asn Ile Lys Phe Ala Asn Glu Ser  
290 295 300

Gly Met Asn Leu Leu Asp Phe Glu Tyr Ala Gln Glu Val Arg Glu Val  
305 310 315 320

Phe Arg Asp Lys Thr Glu Thr Met Lys Asp Leu Tyr Glu Val Leu Ala  
325 330 335

Ser Thr Glu Ser Gln Tyr Asp Tyr Ile Asn Asn Met Val Thr Phe Ile  
340 345 350

Asp Asn His Asp Met Asp Arg Phe Gln Val Ala Gly Ser Gly Thr Arg  
355 360 365

Ala Thr Glu Gln Ala Leu Ala Leu Thr Leu Thr Ser Arg Gly Val Pro  
370 375 380

Ala Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Thr Gly Asp Gly Asp Pro  
385 390 395 400

Asn Asn Arg Ala Met Met Thr Ser Phe Asn Thr Gly Thr Thr Ala Tyr  
405 410 415

Lys Val Ile Gln Ala Leu Ala Pro Leu Arg Lys Ser Asn Pro Ala Ile  
420 425 430

Ala Tyr Gly Thr Thr Thr Glu Arg Trp Val Asn Asn Asp Val Leu Ile  
435 440 445

Ile Glu Arg Lys Phe Gly Ser Ser Ala Ala Leu Val Ala Ile Asn Arg  
450 455 460

Asn Ser Ser Ala Ala Tyr Pro Ile Ser Gly Leu Leu Ser Ser Leu Pro  
465 470 475 480

Ala Gly Thr Tyr Ser Asp Val Leu Asn Gly Leu Leu Asn Gly Asn Ser  
485 490 495

Ile Thr Val Gly Ser Gly Gly Ala Val Thr Asn Phe Thr Leu Ala Ala  
500 505 510

Gly Gly Thr Ala Val Trp Gln Tyr Thr Ala Pro Glu Thr Ser Pro Ala  
515 520 525

Ile Gly Asn Val Gly Pro Thr Met Gly Gln Pro Gly Asn Ile Val Thr  
530 535 540

Ile Asp Gly Arg Gly Phe Gly Gly Thr Ala Gly Thr Val Tyr Phe Gly  
545 550 555 560

Thr Thr Ala Val Thr Gly Ser Gly Ile Val Ser Trp Glu Asp Thr Gln  
565 570 575

Ile Lys Ala Val Ile Pro Lys Val Ala Ala Gly Lys Thr Gly Val Ser  
580 585 590

Val Lys Thr Ser Ser Gly Thr Ala Ser Asn Thr Phe Lys Ser Phe Asn  
595 600 605

Val Leu Thr Gly Asp Gln Val Thr Val Arg Phe Leu Val Asn Gln Ala  
610 615 620

Asn Thr Asn Tyr Gly Thr Asn Val Tyr Leu Val Gly Asn Ala Ala Glu  
625 630 635 640

Leu Gly Ser Trp Asp Pro Asn Lys Ala Ile Gly Pro Met Tyr Asn Gln  
645 650 655

Val Ile Ala Lys Tyr Pro Ser Trp Tyr Tyr Asp Val Ser Val Pro Ala  
660 665 670

Gly Thr Lys Leu Asp Phe Lys Phe Ile Lys Lys Gly Gly Gly Thr Val  
675 680 685

Thr Trp Glu Gly Gly Gly Asn His Thr Tyr Thr Thr Pro Ala Ser Gly  
690 695 700

Val Gly Thr Val Thr Val Asp Trp Gln Asn

705

710

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 <213> Panibacillus macerans  
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 20 25 30

Val Asn Asn Lys Leu Asn Phe Ser Thr Asp Thr Val Tyr Gln Ile Val  
 35 40 45

Thr Asp Arg Phe Val Asp Gly Asn Ser Ala Asn Asn Pro Thr Gly Ala  
 50 55 60

Ala Phe Ser Ser Asp His Ser Asn Leu Lys Leu Tyr Phe Gly Gly Asp  
 65 70 75 80

Trp Gln Gly Ile Thr Asn Lys Ile Asn Asp Gly Tyr Leu Thr Gly Met  
 85 90 95

Gly Ile Thr Ala Leu Trp Ile Ser Gln Pro Val Glu Asn Ile Thr Ala  
 100 105 110

Val Ile Asn Tyr Ser Gly Val Asn Asn Thr Ala Tyr His Gly Tyr Trp  
 115 120 125

Pro Arg Asp Phe Lys Lys Thr Asn Ala Ala Phe Gly Ser Phe Thr Asp  
 130 135 140

Phe Ser Asn Leu Ile Ala Ala Ala His Ser His Asn Ile Lys Val Val  
 145 150 155 160

Met Asp Phe Ala Pro Asn His Thr Asn Pro Ala Ser Ser Thr Asp Pro  
 165 170 175

Ser Phe Ala Glu Asn Gly Ala Leu Tyr Asn Asn Gly Thr Leu Leu Gly  
 180 185 190

Lys Tyr Ser Asn Asp Thr Ala Gly Leu Phe His His Asn Gly Gly Thr  
195 200 205

Asp Phe Ser Thr Thr Glu Ser Gly Ile Tyr Lys Asn Leu Tyr Asp Leu  
210 215 220

Ala Asp Ile Asn Gln Asn Asn Asn Thr Ile Asp Ser Tyr Leu Lys Glu  
225 230 235 240

Ser Ile Gln Leu Trp Leu Asn Leu Gly Val Asp Gly Ile Arg Phe Asp  
245 250 255

Ala Val Lys His Met Pro Gln Gly Trp Gln Lys Ser Tyr Val Ser Ser  
260 265 270

Ile Tyr Ser Ser Ala Asn Pro Val Phe Thr Phe Gly Glu Trp Phe Leu  
275 280 285

Gly Pro Asp Glu Met Thr Gln Asp Asn Ile Asn Phe Ala Asn Gln Ser  
290 295 300

Gly Met His Leu Leu Asp Phe Ala Phe Ala Gln Glu Ile Arg Glu Val  
305 310 315 320

Phe Arg Asp Lys Ser Glu Thr Met Thr Asp Leu Asn Ser Val Ile Ser  
325 330 335

Ser Thr Gly Ser Ser Tyr Asn Tyr Ile Asn Asn Met Val Thr Phe Ile  
340 345 350

Asp Asn His Asp Met Asp Arg Phe Gln Gln Ala Gly Ala Ser Thr Arg  
355 360 365

Pro Thr Glu Gln Ala Leu Ala Val Thr Leu Thr Ser Arg Gly Val Pro  
370 375 380

Ala Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Thr Gly Asn Gly Asp Pro  
385 390 395 400

Asn Asn Arg Gly Met Met Thr Gly Phe Asp Thr Asn Lys Thr Ala Tyr  
405 410 415

Lys Val Ile Lys Ala Leu Ala Pro Leu Arg Lys Ser Asn Pro Ala Leu  
420 425 430

Ala Tyr Gly Ser Thr Thr Gln Arg Trp Val Asn Ser Asp Val Tyr Val  
435 440 445

Tyr Glu Arg Lys Phe Gly Ser Asn Val Ala Leu Val Ala Val Asn Arg  
450 455 460

Ser Ser Thr Thr Ala Tyr Pro Ile Ser Gly Ala Leu Thr Ala Leu Pro  
465 470 475 480

Asn Gly Thr Tyr Thr Asp Val Leu Gly Gly Leu Leu Asn Gly Asn Ser  
485 490 495

Ile Thr Val Asn Gly Gly Thr Val Ser Asn Phe Thr Leu Ala Ala Gly  
500 505 510

Gly Thr Ala Val Trp Gln Tyr Thr Thr Thr Glu Ser Ser Pro Ile Ile  
515 520 525

Gly Asn Val Gly Pro Thr Met Gly Lys Pro Gly Asn Thr Ile Thr Ile  
530 535 540

Asp Gly Arg Gly Phe Gly Thr Thr Lys Asn Lys Val Thr Phe Gly Thr  
545 550 555 560

Thr Ala Val Thr Gly Ala Asn Ile Val Ser Trp Glu Asp Thr Glu Ile  
565 570 575

Lys Val Lys Val Pro Asn Val Ala Ala Gly Asn Thr Ala Val Thr Val  
580 585 590

Thr Asn Ala Ala Gly Thr Thr Ser Ala Ala Phe Asn Asn Phe Asn Val  
595 600 605

Leu Thr Ala Asp Gln Val Thr Val Arg Phe Lys Val Asn Asn Ala Thr  
610 615 620

Thr Ala Leu Gly Gln Asn Val Tyr Leu Thr Gly Asn Val Ala Glu Leu  
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Gly Asn Trp Thr Ala Ala Asn Ala Ile Gly Pro Met Tyr Asn Gln Val

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Thr	Ala	Leu	Gln	Phe	Lys	Phe	Ile	Lys	Val	Asn	Gly	Ser	Thr	Val	Thr
		675					680					685			
Trp	Glu	Gly	Gly	Asn	Asn	His	Thr	Phe	Thr	Ser	Pro	Ser	Ser	Gly	Val
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		20						25					30		
Asn	Pro	Thr	Gly	Asp	Leu	Tyr	Asp	Pro	Thr	His	Thr	Ser	Leu	Lys	Lys
		35					40					45			
Tyr	Phe	Gly	Gly	Asp	Trp	Gln	Gly	Ile	Ile	Asn	Lys	Ile	Asn	Asp	Gly
	50					55					60				
Tyr	Leu	Thr	Gly	Met	Gly	Val	Thr	Ala	Ile	Trp	Ile	Ser	Gln	Pro	Val
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Glu	Asn	Ile	Tyr	Ala	Val	Leu	Pro	Asp	Ser	Thr	Phe	Gly	Gly	Ser	Thr
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Ser	Tyr	His	Gly	Tyr	Trp	Ala	Arg	Asp	Phe	Lys	Arg	Thr	Asn	Pro	Tyr
			100					105						110	
Phe	Gly	Ser	Phe	Thr	Asp	Phe	Gln	Asn	Leu	Ile	Asn	Thr	Ala	His	Ala
	115						120					125			

His Asn Ile Lys Val Ile Ile Asp Phe Ala Pro Asn His Thr Ser Pro  
130 135 140

Ala Ser Glu Thr Asp Pro Thr Tyr Ala Glu Asn Gly Arg Leu Tyr Asp  
145 150 155 160

Asn Gly Thr Leu Leu Gly Gly Tyr Thr Asn Asp Thr Asn Gly Tyr Phe  
165 170 175

His His Tyr Gly Gly Thr Asp Phe Ser Ser Tyr Glu Asp Gly Ile Tyr  
180 185 190

Arg Asn Leu Phe Asp Leu Ala Asp Leu Asn Gln Gln Asn Ser Thr Ile  
195 200 205

Asp Ser Tyr Leu Lys Ser Ala Ile Lys Val Trp Leu Asp Met Gly Ile  
210 215 220

Asp Gly Ile Arg Leu Asp Ala Val Lys His Met Pro Phe Gly Trp Gln  
225 230 235 240

Lys Asn Phe Met Asp Ser Ile Leu Ser Tyr Arg Pro Val Phe Thr Phe  
245 250 255

Gly Glu Trp Phe Leu Gly Thr Asn Glu Ile Asp Val Asn Asn Thr Tyr  
260 265 270

Phe Ala Asn Glu Ser Gly Met Ser Leu Leu Asp Phe Arg Phe Ser Gln  
275 280 285

Lys Val Arg Gln Val Phe Arg Asp Asn Thr Asp Thr Met Tyr Gly Leu  
290 295 300

Asp Ser Met Ile Gln Ser Thr Ala Ser Asp Tyr Asn Phe Ile Asn Asp  
305 310 315 320

Met Val Thr Phe Ile Asp Asn His Asp Met Asp Arg Phe Tyr Asn Gly  
325 330 335

Gly Ser Thr Arg Pro Val Glu Gln Ala Leu Ala Phe Thr Leu Thr Ser  
340 345 350

Arg Gly Val Pro Ala Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Thr Gly  
355 360 365

Asn Gly Asp Pro Tyr Asn Arg Ala Met Met Thr Ser Phe Asn Thr Ser  
370 375 380

Thr Thr Ala Tyr Asn Val Ile Lys Lys Leu Ala Pro Leu Arg Lys Ser  
385 390 395 400

Asn Pro Ala Ile Ala Tyr Gly Thr Thr Gln Gln Arg Trp Ile Asn Asn  
405 410 415

Asp Val Tyr Ile Tyr Glu Arg Lys Phe Gly Asn Asn Val Ala Leu Val  
420 425 430

Ala Ile Asn Arg Asn Leu Ser Thr Ser Tyr Asn Ile Thr Gly Leu Tyr  
435 440 445

Thr Ala Leu Pro Ala Gly Thr Tyr Thr Asp Val Leu Gly Gly Leu Leu  
450 455 460

Asn Gly Asn Ser Ile Ser Val Ala Ser Asp Gly Ser Val Thr Pro Phe  
465 470 475 480

Thr Leu Ser Ala Gly Glu Val Ala Val Trp Gln Tyr Val Ser Ser Ser  
485 490 495

Asn Ser Pro Leu Ile Gly His Val Gly Pro Thr Met Thr Lys Ala Gly  
500 505 510

Gln Thr Ile Thr Ile Asp Gly Arg Gly Phe Gly Thr Thr Ser Gly Gln  
515 520 525

Val Leu Phe Gly Ser Thr Ala Gly Thr Ile Val Ser Trp Asp Asp Thr  
530 535 540

Glu Val Lys Val Lys Val Pro Ser Val Thr Pro Gly Lys Tyr Asn Ile  
545 550 555 560

Ser Leu Lys Thr Ser Ser Gly Ala Thr Ser Asn Thr Tyr Asn Asn Ile  
565 570 575

Asn Ile Leu Thr Gly Asn Gln Ile Cys Val Arg Phe Val Val Asn Asn



580

585

590

Ala Ser Thr Val Tyr Gly Glu Asn Val Tyr Leu Thr Gly Asn Val Ala  
595 600 605

Glu Leu Gly Asn Trp Asp Thr Ser Lys Ala Ile Gly Pro Met Phe Asn  
610 615 620

Gln Val Val Tyr Gln Tyr Pro Thr Trp Tyr Tyr Asp Val Ser Val Pro  
625 630 635 640

Ala Gly Thr Thr Ile Gln Phe Lys Phe Ile Lys Lys Asn Gly Asn Thr  
645 650 655

Ile Thr Trp Glu Gly Gly Ser Asn His Thr Tyr Thr Val Pro Ser Ser  
660 665 670

Ser Thr Gly Thr Val Ile Val Asn Trp Gln Gln  
675 680

<210> 6  
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<213> Thermoanaerobacter sp.

<400> 6

Ala Pro Asp Thr Ser Val Ser Asn Val Val Asn Tyr Ser Thr Asp Val  
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Ile Tyr Gln Ile Val Thr Asp Arg Phe Leu Asp Gly Asn Pro Ser Asn  
20 25 30

Asn Pro Thr Gly Asp Leu Tyr Asp Pro Thr His Thr Ser Leu Lys Lys  
35 40 45

Tyr Phe Gly Gly Asp Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly  
50 55 60

Tyr Leu Thr Gly Met Gly Ile Thr Ala Ile Trp Ile Ser Gln Pro Val  
65 70 75 80

Glu Asn Ile Tyr Ala Val Leu Pro Asp Ser Thr Phe Gly Gly Ser Thr  
85 90 95

Ser Tyr His Gly Tyr Trp Ala Arg Asp Phe Lys Lys Thr Asn Pro Phe  
100 105 110

Phe Gly Ser Phe Thr Asp Phe Gln Asn Leu Ile Ala Thr Ala His Ala  
115 120 125

His Asn Ile Lys Val Ile Ile Asp Phe Ala Pro Asn His Thr Ser Pro  
130 135 140

Ala Ser Glu Thr Asp Pro Thr Tyr Gly Glu Asn Gly Arg Leu Tyr Asp  
145 150 155 160

Asn Gly Val Leu Leu Gly Gly Tyr Thr Asn Asp Thr Asn Gly Tyr Phe  
165 170 175

His His Tyr Gly Gly Thr Asn Phe Ser Ser Tyr Glu Asp Gly Ile Tyr  
180 185 190

Arg Asn Leu Phe Asp Leu Ala Asp Leu Asp Gln Gln Asn Ser Thr Ile  
195 200 205

Asp Ser Tyr Leu Lys Ala Ala Ile Lys Leu Trp Leu Asp Met Gly Ile  
210 215 220

Asp Gly Ile Arg Met Asp Ala Val Lys His Met Ala Phe Gly Trp Gln  
225 230 235 240

Lys Asn Phe Met Asp Ser Ile Leu Ser Tyr Arg Pro Val Phe Thr Phe  
245 250 255

Gly Glu Trp Tyr Leu Gly Thr Asn Glu Val Asp Pro Asn Asn Thr Tyr  
260 265 270

Phe Ala Asn Glu Ser Gly Met Ser Leu Leu Asp Phe Arg Phe Ala Gln  
275 280 285

Lys Val Arg Gln Val Phe Arg Asp Asn Thr Asp Thr Met Tyr Gly Leu  
290 295 300

Asp Ser Met Ile Gln Ser Thr Ala Ala Asp Tyr Asn Phe Ile Asn Asp  
305 310 315 320

Met Val Thr Phe Ile Asp Asn His Asp Met Asp Arg Phe Tyr Thr Gly  
325 330 335

Gly Ser Thr Arg Pro Val Glu Gln Ala Leu Ala Phe Thr Leu Thr Ser  
340 345 350

Arg Gly Val Pro Ala Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Thr Gly  
355 360 365

Asn Gly Asp Pro Tyr Asn Arg Ala Met Met Thr Ser Phe Asp Thr Thr  
370 375 380

Thr Thr Ala Tyr Asn Val Ile Lys Lys Leu Ala Pro Leu Arg Lys Ser  
385 390 395 400

Asn Pro Ala Ile Ala Tyr Gly Thr Gln Lys Gln Arg Trp Ile Asn Asn  
405 410 415

Asp Val Tyr Ile Tyr Glu Arg Gln Phe Gly Asn Asn Val Ala Leu Val  
420 425 430

Ala Ile Asn Arg Asn Leu Ser Thr Ser Tyr Tyr Ile Thr Gly Leu Tyr  
435 440 445

Thr Ala Leu Pro Ala Gly Thr Tyr Ser Asp Met Leu Gly Gly Leu Leu  
450 455 460

Asn Gly Ser Ser Ile Thr Val Ser Ser Asn Gly Ser Val Thr Pro Phe  
465 470 475 480

Thr Leu Ala Pro Gly Glu Val Ala Val Trp Gln Tyr Val Ser Thr Thr  
485 490 495

Asn Pro Pro Leu Ile Gly His Val Gly Pro Thr Met Thr Lys Ala Gly  
500 505 510

Gln Thr Ile Thr Ile Asp Gly Arg Gly Phe Gly Thr Thr Ala Gly Gln  
515 520 525

Val Leu Phe Gly Thr Thr Pro Ala Thr Ile Val Ser Trp Glu Asp Thr  
530 535 540

Glu Val Lys Val Lys Val Pro Ala Leu Thr Pro Gly Lys Tyr Asn Ile

545 550 555 560

Thr Leu Lys Thr Ala Ser Gly Val Thr Ser Asn Ser Tyr Asn Asn Ile  
565 570 575

Asn Val Leu Thr Gly Asn Gln Val Cys Val Arg Phe Val Val Asn Asn  
580 585 590

Ala Thr Thr Val Trp Gly Glu Asn Val Tyr Leu Thr Gly Asn Val Ala  
595 600 605

Glu Leu Gly Asn Trp Asp Thr Ser Lys Ala Ile Gly Pro Met Phe Asn  
610 615 620

Gln Val Val Tyr Gln Tyr Pro Thr Trp Tyr Tyr Asp Val Ser Val Pro  
625 630 635 640

Ala Gly Thr Thr Ile Glu Phe Lys Phe Ile Lys Lys Asn Gly Ser Thr  
645 650 655

Val Thr Trp Glu Gly Gly Tyr Asn His Val Tyr Thr Thr Pro Thr Ser  
660 665 670

Gly Thr Ala Thr Val Ile Val Asp Trp Gln Pro  
675 680

<210> 7  
<211> 718  
<212> PRT  
<213> Bacillus circulans

<400> 7

Met Phe Gln Met Ala Lys Arg Ala Phe Leu Ser Thr Thr Leu Thr Leu  
1 5 10 15

Gly Leu Leu Ala Gly Ser Ala Leu Pro Phe Leu Pro Ala Ser Ala Val  
20 25 30

Tyr Ala Asp Pro Asp Thr Ala Val Thr Asn Lys Gln Ser Phe Ser Thr  
35 40 45

Asp Val Ile Tyr Gln Val Phe Thr Asp Arg Phe Leu Asp Gly Asn Pro  
50 55 60

Ser Asn Asn Pro Thr Gly Ala Ala Tyr Asp Ala Thr Cys Ser Asn Leu  
65 70 75 80

Lys Leu Tyr Cys Gly Gly Asp Trp Gln Gly Leu Ile Asn Lys Ile Asn  
85 90 95

Asp Asn Tyr Phe Ser Asp Leu Gly Val Thr Ala Leu Trp Ile Ser Gln  
100 105 110

Pro Val Glu Asn Ile Phe Ala Thr Ile Asn Tyr Ser Gly Val Thr Asn  
115 120 125

Thr Ala Tyr His Gly Tyr Trp Ala Arg Asp Phe Lys Lys Thr Asn Pro  
130 135 140

Tyr Phe Gly Thr Met Ala Asp Phe Gln Asn Leu Ile Thr Thr Ala His  
145 150 155 160

Ala Lys Gly Ile Lys Ile Val Ile Asp Phe Ala Pro Asn His Thr Ser  
165 170 175

Pro Ala Met Glu Thr Asp Thr Ser Phe Ala Glu Asn Gly Arg Leu Tyr  
180 185 190

Asp Asn Gly Thr Leu Val Gly Gly Tyr Thr Asn Asp Thr Asn Gly Tyr  
195 200 205

Phe His His Asn Gly Gly Ser Asp Phe Ser Ser Leu Glu Asn Gly Ile  
210 215 220

Tyr Lys Asn Leu Tyr Asp Leu Ala Asp Phe Asn His Asn Asn Ala Thr  
225 230 235 240

Ile Asp Lys Tyr Phe Lys Asp Ala Ile Lys Leu Trp Leu Asp Met Gly  
245 250 255

Val Asp Gly Ile Arg Val Asp Ala Val Lys His Met Pro Leu Gly Trp  
260 265 270

Gln Lys Ser Trp Met Ser Ser Ile Tyr Ala His Lys Pro Val Phe Thr  
275 280 285

Phe Gly Glu Trp Phe Leu Gly Ser Ala Ala Ser Asp Ala Asp Asn Thr  
290 295 300

Asp Phe Ala Asn Lys Ser Gly Met Ser Leu Leu Asp Phe Arg Phe Asn  
305 310 315 320

Ser Ala Val Arg Asn Val Phe Arg Asp Asn Thr Ser Asn Met Tyr Ala  
325 330 335

Leu Asp Ser Met Ile Asn Ser Thr Ala Thr Asp Tyr Asn Gln Val Asn  
340 345 350

Asp Gln Val Thr Phe Ile Asp Asn His Asp Met Asp Arg Phe Lys Thr  
355 360 365

Ser Ala Val Asn Asn Arg Arg Leu Glu Gln Ala Leu Ala Phe Thr Leu  
370 375 380

Thr Ser Arg Gly Val Pro Ala Ile Tyr Tyr Gly Thr Glu Gln Tyr Leu  
385 390 395 400

Thr Gly Asn Gly Asp Pro Asp Asn Arg Ala Lys Met Pro Ser Phe Ser  
405 410 415

Lys Ser Thr Thr Ala Phe Asn Val Ile Ser Lys Leu Ala Pro Leu Arg  
420 425 430

Lys Ser Asn Pro Ala Ile Ala Tyr Gly Ser Thr Gln Gln Arg Trp Ile  
435 440 445

Asn Asn Asp Val Tyr Val Tyr Glu Arg Lys Phe Gly Lys Ser Val Ala  
450 455 460

Val Val Ala Val Asn Arg Asn Leu Ser Thr Ser Ala Ser Ile Thr Gly  
465 470 475 480

Leu Ser Thr Ser Leu Pro Thr Gly Ser Tyr Thr Asp Val Leu Gly Gly  
485 490 495

Val Leu Asn Gly Asn Asn Ile Thr Ser Thr Asn Gly Ser Ile Asn Asn  
500 505 510

Phe Thr Leu Ala Ala Gly Ala Thr Ala Val Trp Gln Tyr Thr Thr Ala

515	520	525
Glu Thr Thr Pro Thr Ile Gly His Val Gly Pro Val Met Gly Lys Pro		
530	535	540
Gly Asn Val Val Thr Ile Asp Gly Arg Gly Phe Gly Ser Thr Lys Gly		
545	550	555
Thr Val Tyr Phe Gly Thr Thr Ala Val Thr Gly Ala Ala Ile Thr Ser		
565	570	575
Trp Glu Asp Thr Gln Ile Lys Val Thr Ile Pro Ser Val Ala Ala Gly		
580	585	590
Asn Tyr Ala Val Lys Val Ala Ala Ser Gly Val Asn Ser Asn Ala Tyr		
595	600	605
Asn Asn Phe Thr Ile Leu Thr Gly Asp Gln Val Thr Val Arg Phe Val		
610	615	620
Val Asn Asn Ala Ser Thr Thr Leu Gly Gln Asn Leu Tyr Leu Thr Gly		
625	630	635
Asn Val Ala Glu Leu Gly Asn Trp Ser Thr Gly Ser Thr Ala Ile Gly		
645	650	655
Pro Ala Phe Asn Gln Val Ile His Gln Tyr Pro Thr Trp Tyr Tyr Asp		
660	665	670
Val Ser Val Pro Ala Gly Lys Gln Leu Glu Phe Lys Phe Phe Lys Lys		
675	680	685
Asn Gly Ser Thr Ile Thr Trp Glu Ser Gly Ser Asn His Thr Phe Thr		
690	695	700
Thr Pro Ala Ser Gly Thr Ala Thr Val Thr Val Asn Trp Gln		
705	710	715

<210> 8  
 <211> 718  
 <212> PRT  
 <213> Bacillus sp. 38-2  
 <400> 8

Met Phe Gln Met Ala Lys Arg Val Leu Leu Ser Thr Thr Leu Thr Phe  
1 5 10 15

Ser Leu Leu Ala Gly Ser Ala Leu Pro Phe Leu Pro Ala Ser Ala Ile  
20 25 30

Tyr Ala Asp Ala Asp Thr Ala Val Thr Asn Lys Gln Asn Phe Ser Thr  
35 40 45

Asp Val Ile Tyr Gln Val Phe Thr Asp Arg Phe Leu Asp Gly Asn Pro  
50 55 60

Ser Asn Asn Pro Thr Gly Ala Ala Phe Asp Gly Thr Cys Ser Asn Leu  
65 70 75 80

Lys Leu Tyr Cys Gly Gly Asp Trp Gln Gly Leu Val Asn Lys Ile Asn  
85 90 95

Asp Asn Tyr Phe Ser Asp Leu Gly Val Thr Ala Leu Trp Ile Ser Gln  
100 105 110

Pro Val Glu Asn Ile Phe Ala Thr Ile Asn Tyr Ser Gly Val Thr Asn  
115 120 125

Thr Ala Tyr His Gly Tyr Trp Ala Arg Asp Phe Lys Lys Thr Asn Pro  
130 135 140

Tyr Phe Gly Thr Met Thr Asp Phe Gln Asn Leu Val Thr Thr Ala His  
145 150 155 160

Ala Lys Gly Ile Lys Ile Ile Ile Asp Phe Ala Pro Asn His Thr Ser  
165 170 175

Pro Ala Met Glu Thr Asp Thr Ser Phe Ala Glu Asn Gly Lys Leu Tyr  
180 185 190

Asp Asn Gly Asn Leu Val Gly Gly Tyr Thr Asn Asp Thr Asn Gly Tyr  
195 200 205

Phe His His Asn Gly Gly Ser Asp Phe Ser Thr Leu Glu Asn Gly Ile  
210 215 220



Tyr Lys Asn Leu Tyr Asp Leu Ala Asp Leu Asn His Asn Asn Ser Thr  
225 230 235 240

Ile Asp Thr Tyr Phe Lys Asp Ala Ile Lys Leu Trp Leu Asp Met Gly  
245 250 255

Val Asp Gly Ile Arg Val Asp Ala Val Lys His Met Pro Gln Gly Trp  
260 265 270

Gln Lys Asn Trp Met Ser Ser Ile Tyr Ala His Lys Pro Val Phe Thr  
275 280 285

Phe Gly Glu Trp Phe Leu Gly Ser Ala Ala Pro Asp Ala Asp Asn Thr  
290 295 300

Asp Phe Ala Asn Glu Ser Gly Met Ser Leu Leu Asp Phe Arg Phe Asn  
305 310 315 320

Ser Ala Val Arg Asn Val Phe Arg Asp Asn Thr Ser Asn Met Tyr Ala  
325 330 335

Leu Asp Ser Met Leu Thr Ala Thr Ala Ala Asp Tyr Asn Gln Val Asn  
340 345 350

Asp Gln Val Thr Phe Ile Asp Asn His Asp Met Asp Arg Phe Lys Thr  
355 360 365

Ser Ala Val Asn Asn Arg Arg Leu Glu Gln Ala Leu Ala Phe Thr Leu  
370 375 380

Thr Ser Arg Gly Val Pro Ala Ile Tyr Tyr Gly Thr Glu Gln Tyr Leu  
385 390 395 400

Thr Gly Asn Gly Asp Pro Asp Asn Arg Gly Lys Met Pro Ser Phe Ser  
405 410 415

Lys Ser Thr Thr Ala Phe Asn Val Ile Ser Lys Leu Ala Pro Leu Arg  
420 425 430

Lys Ser Asn Pro Ala Ile Ala Tyr Gly Ser Thr Gln Gln Arg Trp Ile  
435 440 445

Asn Asn Asp Val Tyr Ile Tyr Glu Arg Lys Phe Gly Lys Ser Val Ala

450		455		460											
Val	Val	Ala	Val	Asn	Arg	Asn	Leu	Thr	Thr	Pro	Thr	Ser	Ile	Thr	Asn
465				470						475					480
Leu	Asn	Thr	Ser	Leu	Pro	Ser	Gly	Thr	Tyr	Thr	Asp	Val	Leu	Gly	Gly
				485					490					495	
Val	Leu	Asn	Gly	Asn	Asn	Ile	Thr	Ser	Ser	Gly	Gly	Asn	Ile	Ser	Ser
			500					505					510		
Phe	Thr	Leu	Ala	Ala	Gly	Ala	Thr	Ala	Val	Trp	Gln	Tyr	Thr	Ala	Ser
		515					520					525			
Glu	Thr	Thr	Pro	Thr	Ile	Gly	His	Val	Gly	Pro	Val	Met	Gly	Lys	Pro
	530					535					540				
Gly	Asn	Val	Val	Thr	Ile	Asp	Gly	Arg	Gly	Phe	Gly	Ser	Ala	Lys	Gly
545					550					555					560
Thr	Val	Tyr	Phe	Gly	Thr	Thr	Ala	Val	Thr	Gly	Ser	Ala	Ile	Thr	Ser
				565					570					575	
Trp	Glu	Asp	Thr	Gln	Ile	Lys	Val	Thr	Ile	Pro	Pro	Val	Ala	Gly	Gly
			580					585					590		
Asp	Tyr	Ala	Val	Lys	Val	Ala	Ala	Asn	Gly	Val	Asn	Ser	Asn	Ala	Tyr
		595					600					605			
Asn	Asp	Phe	Thr	Ile	Leu	Ser	Gly	Asp	Gln	Val	Ser	Val	Arg	Phe	Val
	610					615					620				
Ile	Asn	Asn	Ala	Thr	Thr	Ala	Leu	Gly	Glu	Asn	Ile	Tyr	Leu	Thr	Gly
625					630					635					640
Asn	Val	Ser	Glu	Leu	Gly	Asn	Trp	Thr	Thr	Gly	Ala	Ala	Ser	Ile	Gly
				645					650					655	
Pro	Ala	Phe	Asn	Gln	Val	Ile	His	Ala	Tyr	Pro	Thr	Trp	Tyr	Tyr	Asp
			660					665					670		
Val	Ser	Val	Pro	Ala	Gly	Lys	Gln	Leu	Glu	Phe	Lys	Phe	Phe	Lys	Lys
		675					680					685			

Asn Gly Ala Thr Ile Thr Trp Glu Gly Gly Ser Asn His Thr Phe Thr  
690 695 700

Thr Pro Thr Ser Gly Thr Ala Thr Val Thr Ile Asn Trp Gln  
705 710 715

<210> 9  
<211> 713  
<212> PRT  
<213> Bacillus sp. 1011

<400> 9

Met Lys Arg Phe Met Lys Leu Thr Ala Val Trp Thr Leu Trp Leu Ser  
1 5 10 15

Leu Thr Leu Gly Leu Leu Ser Pro Val His Ala Ala Pro Asp Thr Ser  
20 25 30

Val Ser Asn Lys Gln Asn Phe Ser Thr Asp Val Ile Tyr Gln Ile Phe  
35 40 45

Thr Asp Arg Phe Ser Asp Gly Asn Pro Ala Asn Asn Pro Thr Gly Ala  
50 55 60

Ala Phe Asp Gly Ser Cys Thr Asn Leu Arg Leu Tyr Cys Gly Gly Asp  
65 70 75 80

Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly Tyr Leu Thr Gly Met  
85 90 95

Gly Ile Thr Ala Ile Trp Ile Ser Gln Pro Val Glu Asn Ile Tyr Ser  
100 105 110

Val Ile Asn Tyr Ser Gly Val Asn Asn Thr Ala Tyr His Gly Tyr Trp  
115 120 125

Ala Arg Asp Phe Lys Lys Thr Asn Pro Ala Tyr Gly Thr Met Gln Asp  
130 135 140

Phe Lys Asn Leu Ile Asp Thr Ala His Ala His Asn Ile Lys Val Ile  
145 150 155 160

Ile Asp Phe Ala Pro Asn His Thr Ser Pro Ala Ser Ser Asp Asp Pro  
165 170 175

Ser Phe Ala Glu Asn Gly Arg Leu Tyr Asp Asn Gly Asn Leu Leu Gly  
180 185 190

Gly Tyr Thr Asn Asp Thr Gln Asn Leu Phe His His Tyr Gly Gly Thr  
195 200 205

Asp Phe Ser Thr Ile Glu Asn Gly Ile Tyr Lys Asn Leu Tyr Asp Leu  
210 215 220

Ala Asp Leu Asn His Asn Asn Ser Ser Val Asp Val Tyr Leu Lys Asp  
225 230 235 240

Ala Ile Lys Met Trp Leu Asp Leu Gly Val Asp Gly Ile Arg Val Asp  
245 250 255

Ala Val Lys His Met Pro Phe Gly Trp Gln Lys Ser Phe Met Ala Thr  
260 265 270

Ile Asn Asn Tyr Lys Pro Val Phe Thr Phe Gly Glu Trp Phe Leu Gly  
275 280 285

Val Asn Glu Ile Ser Pro Glu Tyr His Gln Phe Ala Asn Glu Ser Gly  
290 295 300

Met Ser Leu Leu Asp Phe Arg Phe Ala Gln Lys Ala Arg Gln Val Phe  
305 310 315 320

Arg Asp Asn Thr Asp Asn Met Tyr Gly Leu Lys Ala Met Leu Glu Gly  
325 330 335

Ser Glu Val Asp Tyr Ala Gln Val Asn Asp Gln Val Thr Phe Ile Asp  
340 345 350

Asn His Asp Met Glu Arg Phe His Thr Ser Asn Gly Asp Arg Arg Lys  
355 360 365

Leu Glu Gln Ala Leu Ala Phe Thr Leu Thr Ser Arg Gly Val Pro Ala  
370 375 380

Ile Tyr Tyr Gly Ser Glu Gln Tyr Met Ser Gly Gly Asn Asp Pro Asp

385		390		395		400
Asn Arg Ala Arg	Leu Pro Ser Phe Ser Thr Thr Thr Thr	Ala Tyr Gln				
	405		410		415	
Val Ile Gln Lys	Leu Ala Pro Leu Arg Lys Ser Asn Pro	Ala Ile Ala				
	420		425		430	
Tyr Gly Ser Thr	His Glu Arg Trp Ile Asn Asn Asp	Val Ile Ile Tyr				
	435		440		445	
Glu Arg Lys Phe	Gly Asn Asn Val Ala Val Val Ala	Ile Asn Arg Asn				
	450		455		460	
Met Asn Thr Pro	Ala Ser Ile Thr Gly Leu Val Thr Ser	Leu Arg Arg				
	465		470		475	
Ala Ser Tyr Asn	Asp Val Leu Gly Gly Ile Leu Asn Gly	Asn Thr Leu				
	485		490		495	
Thr Val Gly Ala	Gly Gly Ala Ala Ser Asn Phe Thr	Leu Ala Pro Gly				
	500		505		510	
Gly Thr Ala Val	Trp Gln Tyr Thr Thr Asp Ala Thr	Thr Pro Ile Ile				
	515		520		525	
Gly Asn Val Gly	Pro Met Met Ala Lys Pro Gly Val Thr	Ile Thr Ile				
	530		535		540	
Asp Gly Arg Gly	Phe Gly Ser Gly Lys Gly Thr Val Tyr	Phe Gly Thr				
	545		550		555	
Thr Ala Val Thr	Gly Ala Asp Ile Val Ala Trp Glu Asp	Thr Gln Ile				
	565		570		575	
Gln Val Lys Ile	Pro Ala Val Pro Gly Gly Ile Tyr Asp	Ile Arg Val				
	580		585		590	
Ala Asn Ala Ala	Gly Ala Ala Ser Asn Ile Tyr Asp	Asn Phe Glu Val				
	595		600		605	
Leu Thr Gly Asp	Gln Val Thr Val Arg Phe Val	Ile Asn Asn Ala Thr				
	610		615		620	

Thr Ala Leu Gly Gln Asn Val Phe Leu Thr Gly Asn Val Ser Glu Leu  
625 630 635 640

Gly Asn Trp Asp Pro Asn Asn Ala Ile Gly Pro Met Tyr Asn Gln Val  
645 650 655

Val Tyr Gln Tyr Pro Thr Trp Tyr Tyr Asp Val Ser Val Pro Ala Gly  
660 665 670

Gln Thr Ile Glu Phe Lys Phe Leu Lys Lys Gln Gly Ser Thr Val Thr  
675 680 685

Trp Glu Gly Gly Ala Asn Arg Thr Phe Thr Thr Pro Thr Ser Gly Thr  
690 695 700

Ala Thr Val Asn Val Asn Trp Gln Pro  
705 710

<210> 10  
<211> 712  
<212> PRT  
<213> Bacillus sp. 38-2

<400> 10

Met Lys Arg Phe Met Lys Leu Thr Ala Val Trp Thr Leu Trp Leu Ser  
1 5 10 15

Leu Thr Leu Gly Leu Leu Ser Pro Val His Ala Ala Pro Asp Thr Ser  
20 25 30

Val Ser Asn Lys Gln Asn Phe Ser Thr Asp Val Ile Tyr Gln Ile Phe  
35 40 45

Thr Asp Arg Phe Ser Asp Gly Asn Pro Ala Asn Asn Pro Thr Gly Ala  
50 55 60

Ala Phe Asp Gly Ser Cys Thr Asn Leu Arg Leu Tyr Cys Gly Gly Asp  
65 70 75 80

Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly Tyr Leu Thr Gly Met  
85 90 95

Gly Ile Thr Ala Ile Trp Ile Ser Gln Pro Val Glu Asn Ile Tyr Ser  
100 105 110

Val Ile Asn Tyr Ser Gly Val His Asn Thr Ala Tyr His Gly Tyr Trp  
115 120 125

Ala Arg Asp Phe Lys Lys Thr Asn Pro Ala Tyr Gly Thr Met Gln Asp  
130 135 140

Phe Lys Asn Leu Ile Asp Thr Ala His Ala His Asn Ile Lys Val Ile  
145 150 155 160

Ile Asp Phe Ala Pro Asn His Thr Ser Pro Ala Ser Ser Asp Asp Pro  
165 170 175

Ser Phe Ala Glu Asn Gly Arg Leu Tyr Asp Asn Gly Asn Leu Leu Gly  
180 185 190

Gly Tyr Thr Asn Asp Thr Gln Asn Leu Phe His His Tyr Gly Gly Thr  
195 200 205

Asp Phe Ser Thr Ile Glu Asn Gly Ile Tyr Lys Asn Leu Tyr Asp Leu  
210 215 220

Ala Asp Leu Asn His Asn Asn Ser Ser Val Asp Val Tyr Leu Lys Asp  
225 230 235 240

Ala Ile Lys Met Trp Leu Asp Leu Gly Val Asp Gly Ile Arg Val Asp  
245 250 255

Ala Val Lys His Met Pro Phe Gly Trp Gln Lys Ser Phe Met Ser Thr  
260 265 270

Ile Asn Asn Tyr Lys Pro Val Phe Asn Phe Gly Glu Trp Phe Leu Gly  
275 280 285

Val Asn Glu Ile Ser Pro Glu Tyr His Gln Phe Ala Asn Glu Ser Gly  
290 295 300

Met Ser Leu Leu Asp Phe Pro Phe Ala Gln Lys Ala Arg Gln Val Phe  
305 310 315 320

Arg Asp Asn Thr Asp Asn Met Tyr Gly Leu Lys Ala Met Leu Glu Gly

325	330	335
Ser Glu Val Asp Tyr Ala Gln Val Asn Asp Gln Val Thr Phe Ile Asp 340 345 350		
Asn His Asp Met Glu Arg Phe His Thr Ser Asn Gly Asp Arg Arg Lys 355 360 365		
Leu Glu Gln Ala Leu Ala Phe Thr Leu Thr Ser Arg Gly Val Pro Ala 370 375 380		
Ile Tyr Tyr Gly Ser Glu Gln Tyr Met Ser Gly Gly Asn Asp Pro Asp 385 390 395 400		
Asn Arg Ala Arg Ile Pro Ser Phe Ser Thr Thr Thr Thr Ala Tyr Gln 405 410 415		
Val Ile Gln Lys Leu Ala Pro Leu Arg Lys Ser Asn Pro Ala Ile Ala 420 425 430		
Tyr Gly Ser Thr Gln Glu Arg Trp Ile Asn Asn Asp Val Ile Ile Tyr 435 440 445		
Glu Arg Lys Phe Gly Asn Asn Val Ala Val Val Ala Ile Asn Arg Asn 450 455 460		
Met Asn Thr Pro Ala Ser Ile Thr Gly Leu Val Thr Ser Leu Pro Gln 465 470 475 480		
Gly Ser Tyr Asn Asp Val Leu Gly Gly Ile Leu Asn Gly Asn Thr Leu 485 490 495		
Thr Val Gly Ala Gly Gly Ala Ala Ser Asn Phe Thr Leu Ala Pro Gly 500 505 510		
Gly Thr Ala Val Trp Gln Tyr Thr Thr Asp Ala Thr Ala Pro Ile Asn 515 520 525		
Gly Asn Val Gly Pro Met Met Ala Lys Ala Gly Val Thr Ile Thr Ile 530 535 540		
Asp Gly Arg Ala Ser Ala Arg Gln Gly Thr Val Tyr Phe Gly Thr Thr 545 550 555 560		



Ala Val Thr Gly Ala Asp Ile Val Ala Trp Glu Asp Thr Gln Ile Gln  
565 570 575

Val Lys Ile Leu Arg Val Pro Gly Gly Ile Tyr Asp Ile Arg Val Ala  
580 585 590

Asn Ala Ala Gly Ala Ala Ser Asn Ile Tyr Asp Asn Phe Glu Val Leu  
595 600 605

Thr Gly Asp Gln Val Thr Val Arg Phe Val Ile Asn Asn Ala Thr Thr  
610 615 620

Ala Leu Gly Gln Asn Val Phe Leu Thr Gly Asn Val Ser Glu Leu Gly  
625 630 635 640

Asn Trp Asp Pro Asn Asn Ala Ile Gly Pro Met Tyr Asn Gln Val Val  
645 650 655

Tyr Gln Tyr Pro Thr Trp Tyr Tyr Asp Val Ser Val Pro Ala Gly Gln  
660 665 670

Thr Ile Glu Phe Lys Phe Leu Lys Lys Gln Gly Ser Thr Val Thr Trp  
675 680 685

Glu Gly Gly Ala Asn Arg Thr Phe Thr Thr Pro Thr Ser Gly Thr Ala  
690 695 700

Thr Val Asn Val Asn Trp Gln Pro  
705 710

<210> 11  
<211> 713  
<212> PRT  
<213> Bacillus circulans

<400> 11

Met Lys Lys Phe Leu Lys Ser Thr Ala Ala Leu Ala Leu Gly Leu Ser  
1 5 10 15

Leu Thr Phe Gly Leu Phe Ser Pro Ala Gln Ala Ala Pro Asp Thr Ser  
20 25 30

Val Ser Asn Lys Gln Asn Phe Ser Thr Asp Val Ile Tyr Gln Ile Phe  
35 40 45

Thr Asp Arg Phe Ser Asp Gly Asn Pro Ala Asn Asn Pro Thr Gly Ala  
50 55 60

Ala Phe Asp Gly Thr Cys Thr Asn Leu Arg Leu Tyr Cys Gly Gly Asp  
65 70 75 80

Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly Tyr Leu Thr Gly Met  
85 90 95

Gly Val Thr Ala Ile Trp Ile Ser Gln Pro Val Glu Asn Ile Tyr Ser  
100 105 110

Ile Ile Asn Tyr Ser Gly Val Asn Asn Thr Ala Tyr His Gly Tyr Trp  
115 120 125

Ala Arg Asp Phe Lys Lys Thr Asn Pro Ala Tyr Gly Thr Ile Ala Asp  
130 135 140

Phe Gln Asn Leu Ile Ala Ala Ala His Ala Lys Asn Ile Lys Val Ile  
145 150 155 160

Ile Asp Phe Ala Pro Asn His Thr Ser Pro Ala Ser Ser Asp Gln Pro  
165 170 175

Ser Phe Ala Glu Asn Gly Arg Leu Tyr Asp Asn Gly Thr Leu Leu Gly  
180 185 190

Gly Tyr Thr Asn Asp Thr Gln Asn Leu Phe His His Asn Gly Gly Thr  
195 200 205

Asp Phe Ser Thr Thr Glu Asn Gly Ile Tyr Lys Asn Leu Tyr Asp Leu  
210 215 220

Ala Asp Leu Asn His Asn Asn Ser Thr Val Asp Val Tyr Leu Lys Asp  
225 230 235 240

Ala Ile Lys Met Trp Leu Asp Leu Gly Ile Asp Gly Ile Arg Met Asp  
245 250 255

Ala Val Lys His Met Pro Phe Gly Trp Gln Lys Ser Phe Met Ala Ala

260						265						270					
Val	Asn	Asn	Tyr	Lys	Pro	Val	Phe	Thr	Phe	Gly	Glu	Trp	Phe	Leu	Gly		
	275						280					285					
Val	Asn	Glu	Val	Ser	Pro	Glu	Asn	His	Lys	Phe	Ala	Asn	Glu	Ser	Gly		
	290						295				300						
Met	Ser	Leu	Leu	Asp	Phe	Arg	Phe	Ala	Gln	Lys	Val	Arg	Gln	Val	Phe		
305					310					315					320		
Arg	Asp	Asn	Thr	Asp	Asn	Met	Tyr	Gly	Leu	Lys	Ala	Met	Leu	Glu	Gly		
				325					330					335			
Ser	Ala	Ala	Asp	Tyr	Ala	Gln	Val	Asp	Asp	Gln	Val	Thr	Phe	Ile	Asp		
			340					345					350				
Asn	His	Asp	Met	Glu	Arg	Phe	His	Ala	Ser	Asn	Ala	Asn	Arg	Arg	Lys		
		355					360					365					
Leu	Glu	Gln	Ala	Leu	Ala	Phe	Thr	Leu	Thr	Ser	Arg	Gly	Val	Pro	Ala		
	370						375				380						
Ile	Tyr	Tyr	Gly	Thr	Glu	Gln	Tyr	Met	Ser	Gly	Gly	Thr	Asp	Pro	Asp		
385					390					395					400		
Asn	Arg	Ala	Arg	Ile	Pro	Ser	Phe	Ser	Thr	Ser	Thr	Thr	Ala	Tyr	Gln		
				405					410					415			
Val	Ile	Gln	Lys	Leu	Ala	Pro	Leu	Arg	Lys	Cys	Asn	Pro	Ala	Ile	Ala		
			420					425					430				
Tyr	Gly	Ser	Thr	Gln	Glu	Arg	Trp	Ile	Asn	Asn	Asp	Val	Leu	Ile	Tyr		
		435					440					445					
Glu	Arg	Lys	Phe	Gly	Ser	Asn	Val	Ala	Val	Val	Ala	Val	Asn	Arg	Asn		
	450						455				460						
Leu	Asn	Ala	Pro	Ala	Ser	Ile	Ser	Gly	Leu	Val	Thr	Ser	Leu	Pro	Gln		
465					470					475					480		
Gly	Ser	Tyr	Asn	Asp	Val	Leu	Gly	Gly	Leu	Leu	Asn	Gly	Asn	Thr	Leu		
				485					490					495			

Ser Val Gly Ser Gly Gly Ala Ala Ser Asn Phe Thr Leu Ala Ala Gly  
500 505 510

Gly Thr Ala Val Trp Gln Tyr Thr Ala Ala Thr Ala Thr Pro Thr Ile  
515 520 525

Gly His Val Gly Pro Met Met Ala Lys Pro Gly Val Thr Ile Thr Ile  
530 535 540

Asp Gly Arg Gly Phe Gly Ser Ser Lys Gly Thr Val Tyr Phe Gly Thr  
545 550 555 560

Thr Ala Val Ser Gly Ala Asp Ile Thr Ser Trp Glu Asp Thr Gln Ile  
565 570 575

Lys Val Lys Ile Pro Ala Val Ala Gly Gly Asn Tyr Asn Ile Lys Val  
580 585 590

Ala Asn Ala Ala Gly Thr Ala Ser Asn Val Tyr Asp Asn Phe Glu Val  
595 600 605

Leu Ser Gly Asp Gln Val Ser Val Arg Phe Val Val Asn Asn Ala Thr  
610 615 620

Thr Ala Leu Gly Gln Asn Val Tyr Leu Thr Gly Ser Val Ser Glu Leu  
625 630 635 640

Gly Asn Trp Asp Pro Ala Lys Ala Ile Gly Pro Met Tyr Asn Gln Val  
645 650 655

Val Tyr Gln Tyr Pro Asn Trp Tyr Tyr Asp Val Ser Val Pro Ala Gly  
660 665 670

Lys Thr Ile Glu Phe Lys Phe Leu Lys Lys Gln Gly Ser Thr Val Thr  
675 680 685

Trp Glu Gly Gly Ser Asn His Thr Phe Thr Ala Pro Ser Ser Gly Thr  
690 695 700

Ala Thr Ile Asn Val Asn Trp Gln Pro  
705 710

<210> 12  
<211> 686  
<212> PRT  
<213> Bacillus sp.

<400> 12

Ala Pro Asp Thr Ser Val Ser Asn Lys Gln Asn Phe Ser Thr Asp Val  
1 5 10 15

Ile Tyr Gln Ile Phe Thr Asp Arg Phe Ser Asp Gly Asn Pro Ala Asn  
20 25 30

Asn Pro Thr Gly Ala Ala Phe Asp Gly Ser Cys Thr Asn Leu Arg Leu  
35 40 45

Tyr Cys Gly Gly Asp Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly  
50 55 60

Tyr Leu Thr Gly Met Gly Ile Thr Ala Ile Trp Ile Ser Gln Pro Val  
65 70 75 80

Glu Asn Ile Tyr Ser Val Ile Asn Tyr Ser Gly Val Asn Asn Thr Ala  
85 90 95

Tyr His Gly Tyr Trp Ala Arg Asp Phe Lys Lys Thr Asn Pro Ala Tyr  
100 105 110

Gly Thr Met Gln Asp Phe Lys Asn Leu Ile Asp Thr Ala His Ala His  
115 120 125

Asn Ile Lys Val Ile Ile Asp Phe Ala Pro Asn His Thr Ser Pro Ala  
130 135 140

Ser Ser Asp Asp Pro Ser Phe Ala Glu Asn Gly Arg Leu Tyr Asp Asn  
145 150 155 160

Gly Asn Leu Leu Gly Gly Tyr Thr Asn Asp Thr Gln Asn Leu Phe His  
165 170 175

His Tyr Gly Gly Thr Asp Phe Ser Thr Ile Glu Asn Gly Ile Tyr Lys  
180 185 190

Asn Leu Tyr Asp Leu Ala Asp Leu Asn His Asn Asn Ser Ser Val Asp

195	200	205
Val Tyr Leu Lys Asp Ala 210	Ile Lys Met Trp Leu 215	Asp Leu Gly Val Asp 220
Gly Ile Arg Val Asp Ala 225	Val Lys His Met Pro 230	Phe Gly Trp Gln Lys 235
Ser Phe Met Ser Thr 245	Ile Asn Asn Tyr Lys 250	Pro Val Phe Thr Phe Gly 255
Glu Trp Phe Leu Gly Val 260	Asn Glu Ile Ser Pro 265	Glu Tyr His Gln Phe 270
Ala Asn Glu Ser Gly Met 275	Ser Leu Leu Asp Phe 280	Arg Phe Ala Gln Lys 285
Ala Arg Gln Val Phe Arg 290	Asp Asn Thr Asp Asn 295	Met Tyr Gly Leu Lys 300
Ala Met Leu Glu Gly Ser 305	Glu Val Asp Tyr Ala 310	Gln Val Asn Asp Gln 315
Val Thr Phe Ile Asp 325	Asn His Asp Met Glu 330	Arg Phe His Thr Ser Asn 335
Gly Asp Arg Arg Lys 340	Leu Glu Gln Ala Leu 345	Ala Phe Thr Leu Thr Ser 350
Arg Gly Val Pro Ala 355	Ile Tyr Tyr Gly Ser 360	Glu Gln Tyr Met Ser Gly 365
Gly Asn Asp Pro Asp 370	Asn Arg Ala Arg Ile 375	Pro Ser Phe Ser Thr Thr 380
Thr Thr Ala Tyr Gln 385	Val Ile Gln Lys Leu 390	Ala Pro Leu Arg Lys Ser 395
Asn Pro Ala Ile Ala 405	Tyr Gly Ser Thr Gln 410	Glu Arg Trp Ile Asn Asn 415
Asp Val Ile Ile Tyr 420	Glu Arg Lys Phe Gly 425	Asn Asn Val Ala Val Val 430

Ala Ile Asn Arg Asn Met Asn Thr Pro Ala Ser Ile Thr Gly Leu Val  
435 440 445

Thr Ser Leu Pro Gln Gly Ser Tyr Asn Asp Val Leu Gly Gly Ile Leu  
450 455 460

Asn Gly Asn Thr Leu Thr Val Gly Ala Gly Gly Ala Ala Ser Asn Phe  
465 470 475 480

Thr Leu Ala Pro Gly Gly Thr Ala Val Trp Gln Tyr Thr Thr Asp Ala  
485 490 495

Thr Ala Pro Ile Ile Gly Asn Val Gly Pro Met Met Ala Lys Pro Gly  
500 505 510

Val Thr Ile Thr Ile Asp Gly Arg Gly Phe Gly Ser Gly Lys Gly Thr  
515 520 525

Val Tyr Phe Gly Thr Thr Ala Val Thr Gly Ala Asp Ile Val Ala Trp  
530 535 540

Glu Asp Thr Gln Ile Gln Val Lys Ile Pro Ala Val Pro Gly Gly Ile  
545 550 555 560

Tyr Asp Ile Arg Val Ala Asn Ala Ala Gly Ala Ala Ser Asn Ile Tyr  
565 570 575

Asp Asn Phe Glu Val Leu Thr Gly Asp Gln Val Thr Val Arg Phe Val  
580 585 590

Ile Asn Asn Ala Thr Thr Ala Leu Gly Gln Asn Val Phe Leu Thr Gly  
595 600 605

Asn Val Ser Glu Leu Gly Asn Trp Asp Pro Asn Asn Ala Ile Gly Pro  
610 615 620

Met Tyr Asn Gln Val Val Tyr Gln Tyr Pro Thr Trp Tyr Tyr Asp Val  
625 630 635 640

Ser Val Pro Ala Gly Gln Thr Ile Glu Phe Lys Phe Leu Lys Lys Gln  
645 650 655

Gly Ser Thr Val Thr Trp Glu Gly Gly Ala Asn Arg Thr Phe Thr Thr  
660 665 670

Pro Thr Ser Gly Thr Ala Thr Met Asn Val Asn Trp Gln Pro  
675 680 685

<210> 13  
<211> 704  
<212> PRT  
<213> Bacillus ohbensis

<400> 13

Met Lys Asn Leu Thr Val Leu Leu Lys Thr Ile Pro Leu Ala Leu Leu  
1 5 10 15

Leu Phe Ile Leu Leu Ser Leu Pro Thr Ala Ala Gln Ala Asp Val Thr  
20 25 30

Asn Lys Val Asn Tyr Thr Arg Asp Val Ile Tyr Gln Ile Val Thr Asp  
35 40 45

Arg Phe Ser Asp Gly Asp Pro Ser Asn Asn Pro Thr Gly Ala Ile Tyr  
50 55 60

Ser Gln Asp Cys Ser Asp Leu His Lys Tyr Cys Gly Gly Asp Trp Gln  
65 70 75 80

Gly Ile Ile Asp Lys Ile Asn Asp Gly Tyr Leu Thr Asp Leu Gly Ile  
85 90 95

Thr Ala Ile Trp Ile Ser Gln Pro Val Glu Asn Val Tyr Ala Leu His  
100 105 110

Pro Ser Gly Tyr Thr Ser Tyr His Gly Tyr Trp Ala Arg Asp Tyr Lys  
115 120 125

Arg Thr Asn Pro Phe Tyr Gly Asp Phe Ser Asp Phe Asp Arg Leu Met  
130 135 140

Asp Thr Ala His Ser Asn Gly Ile Lys Val Ile Met Asp Phe Thr Pro  
145 150 155 160

Asn His Ser Ser Pro Ala Leu Glu Thr Asp Pro Ser Tyr Ala Glu Asn



165	170	175
Gly Ala Val Tyr Asn Asp Gly Val Leu Ile Gly Asn Tyr Ser Asn Asp 180 185 190		
Pro Asn Asn Leu Phe His His Asn Gly Gly Thr Asp Phe Ser Ser Tyr 195 200 205		
Glu Asp Ser Ile Tyr Arg Asn Leu Tyr Asp Leu Ala Asp Tyr Asp Leu 210 215 220		
Asn Asn Thr Val Met Asp Gln Tyr Leu Lys Glu Ser Ile Lys Leu Trp 225 230 235 240		
Leu Asp Lys Gly Ile Asp Gly Ile Arg Val Asp Ala Val Lys His Met 245 250 255		
Ser Glu Gly Trp Gln Thr Ser Leu Met Ser Asp Ile Tyr Ala His Glu 260 265 270		
Pro Val Phe Thr Phe Gly Glu Trp Phe Leu Gly Ser Gly Glu Val Asp 275 280 285		
Pro Gln Asn His His Phe Ala Asn Glu Ser Gly Met Ser Leu Leu Asp 290 295 300		
Phe Gln Phe Gly Gln Thr Ile Arg Asp Val Leu Met Asp Gly Ser Ser 305 310 315 320		
Asn Trp Tyr Asp Phe Asn Glu Met Ile Ala Ser Thr Glu Glu Asp Tyr 325 330 335		
Asp Glu Val Ile Asp Gln Val Thr Phe Ile Asp Asn His Asp Met Ser 340 345 350		
Arg Phe Ser Phe Glu Gln Ser Ser Asn Arg His Thr Asp Ile Ala Leu 355 360 365		
Ala Val Leu Leu Thr Ser Arg Gly Val Pro Thr Ile Tyr Tyr Gly Thr 370 375 380		
Glu Gln Tyr Leu Thr Gly Gly Asn Asp Pro Glu Asn Arg Lys Pro Met 385 390 395 400		

Ser Asp Phe Asp Arg Thr Thr Asn Ser Tyr Gln Ile Ile Ser Thr Leu  
405 410 415

Ala Ser Leu Arg Gln Asn Asn Pro Ala Leu Gly Tyr Gly Asn Thr Ser  
420 425 430

Glu Arg Trp Ile Asn Ser Asp Val Tyr Ile Tyr Glu Arg Ser Phe Gly  
435 440 445

Asp Ser Val Val Leu Thr Ala Val Asn Ser Gly Asp Thr Ser Tyr Thr  
450 455 460

Ile Asn Asn Leu Asn Thr Ser Leu Pro Gln Gly Gln Tyr Thr Asp Glu  
465 470 475 480

Leu Gln Gln Leu Leu Asp Gly Asn Glu Ile Thr Val Asn Ser Asn Gly  
485 490 495

Ala Val Asp Ser Phe Gln Leu Ser Ala Asn Gly Val Ser Val Trp Gln  
500 505 510

Ile Thr Glu Glu His Ala Ser Pro Leu Ile Gly His Val Gly Pro Met  
515 520 525

Met Gly Lys His Gly Asn Thr Val Thr Ile Thr Gly Glu Gly Phe Gly  
530 535 540

Asp Asn Glu Gly Ser Val Leu Phe Asp Ser Asp Phe Ser Asp Val Leu  
545 550 555 560

Ser Trp Ser Asp Thr Lys Ile Glu Val Ser Val Pro Asp Val Thr Ala  
565 570 575

Gly His Tyr Asp Ile Ser Val Val Asn Ala Gly Asp Ser Gln Ser Pro  
580 585 590

Thr Tyr Asp Lys Phe Glu Val Leu Thr Gly Asp Gln Val Ser Ile Arg  
595 600 605

Phe Ala Val Asn Asn Ala Thr Thr Ser Leu Gly Thr Asn Leu Tyr Met  
610 615 620

Val Gly Asn Val Asn Glu Leu Gly Asn Trp Asp Pro Asp Gln Ala Ile  
625 630 635 640

Gly Pro Met Phe Asn Gln Val Met Tyr Gln Tyr Pro Thr Trp Tyr Tyr  
645 650 655

Asp Ile Ser Val Pro Ala Glu Glu Asn Leu Glu Tyr Lys Phe Ile Lys  
660 665 670

Lys Asp Ser Ser Gly Asn Val Val Trp Glu Ser Gly Asn Asn His Thr  
675 680 685

Tyr Thr Thr Pro Ala Thr Gly Thr Asp Thr Val Leu Val Asp Trp Gln  
690 695 700

<210> 14  
<211> 703  
<212> PRT  
<213> Bacillus sp. 1-1

<400> 14

Met Asn Asp Leu Asn Asp Phe Leu Lys Thr Ile Leu Leu Ser Phe Ile  
1 5 10 15

Phe Phe Leu Leu Leu Ser Leu Pro Thr Val Ala Glu Ala Asp Val Thr  
20 25 30

Asn Lys Val Asn Tyr Ser Lys Asp Val Ile Tyr Gln Ile Val Thr Asp  
35 40 45

Arg Phe Ser Asp Gly Asn Pro Gly Asn Asn Pro Ser Gly Ala Ile Phe  
50 55 60

Ser Gln Asn Cys Ile Asp Leu His Lys Tyr Cys Gly Gly Asp Trp Gln  
65 70 75 80

Gly Ile Ile Asp Lys Ile Asn Asp Gly Tyr Leu Thr Asp Leu Gly Ile  
85 90 95

Thr Ala Leu Trp Ile Ser Gln Pro Val Glu Asn Val Tyr Ala Leu His  
100 105 110

Pro Ser Gly Tyr Thr Ser Tyr His Gly Tyr Trp Ala Arg Asp Tyr Lys

115	120	125
Lys Thr Asn Pro Tyr Tyr Gly Asn Phe Asp Asp Phe Asp Arg Leu Met 130 135 140		
Ser Thr Ala His Ser Asn Gly Ile Lys Val Ile Met Asp Phe Thr Pro 145 150 155 160		
Asn His Ser Ser Pro Ala Leu Glu Thr Asn Pro Asn Tyr Val Glu Asn 165 170 175		
Gly Ala Ile Tyr Asp Asn Gly Ala Leu Leu Gly Asn Tyr Ser Asn Asp 180 185 190		
Gln Gln Asn Leu Phe His His Asn Gly Gly Thr Asp Phe Ser Ser Tyr 195 200 205		
Glu Asp Ser Ile Tyr Arg Asn Leu Tyr Asp Leu Ala Asp Tyr Asp Leu 210 215 220		
Asn Asn Thr Val Met Asp Gln Tyr Leu Lys Glu Ser Ile Lys Phe Trp 225 230 235 240		
Leu Asp Lys Gly Ile Asp Gly Ile Arg Val Asp Ala Val Lys His Met 245 250 255		
Ser Glu Gly Trp Gln Thr Ser Leu Met Ser Glu Ile Tyr Ser His Lys 260 265 270		
Pro Val Phe Thr Phe Gly Glu Trp Phe Leu Gly Ser Gly Glu Val Asp 275 280 285		
Pro Gln Asn His His Phe Ala Asn Glu Ser Gly Met Ser Leu Leu Asp 290 295 300		
Phe Gln Phe Gly Gln Thr Ile Arg Asn Val Leu Lys Asp Arg Thr Ser 305 310 315 320		
Asn Trp Tyr Asp Phe Asn Glu Met Ile Thr Ser Thr Glu Lys Glu Tyr 325 330 335		
Asn Glu Val Ile Asp Gln Val Thr Phe Ile Asp Asn His Asp Met Ser 340 345 350		

Arg Phe Ser Val Gly Ser Ser Ser Asn Arg Gln Thr Asp Met Ala Leu  
355 360 365

Ala Val Leu Leu Thr Ser Arg Gly Val Pro Thr Ile Tyr Tyr Gly Thr  
370 375 380

Glu Gln Tyr Val Thr Gly Gly Asn Asp Pro Glu Asn Arg Lys Pro Leu  
385 390 395 400

Lys Thr Phe Asp Arg Ser Thr Asn Ser Tyr Gln Ile Ile Ser Lys Leu  
405 410 415

Ala Ser Leu Arg Gln Thr Asn Ser Ala Leu Gly Tyr Gly Thr Thr Thr  
420 425 430

Glu Arg Trp Leu Asn Glu Asp Ile Tyr Ile Tyr Glu Arg Thr Phe Gly  
435 440 445

Asn Ser Ile Val Leu Thr Ala Val Asn Ser Ser Asn Ser Asn Gln Thr  
450 455 460

Ile Thr Asn Leu Asn Thr Ser Leu Pro Gln Gly Asn Tyr Thr Asp Glu  
465 470 475 480

Leu Gln Gln Arg Leu Asp Gly Asn Thr Ile Thr Val Asn Ala Asn Gly  
485 490 495

Ala Val Asn Ser Phe Gln Leu Arg Ala Asn Ser Val Ala Val Trp Gln  
500 505 510

Val Ser Asn Pro Ser Thr Ser Pro Leu Ile Gly Gln Val Gly Pro Met  
515 520 525

Met Gly Lys Ala Gly Asn Thr Ile Thr Val Ser Gly Glu Gly Phe Gly  
530 535 540

Asp Glu Arg Gly Ser Val Leu Phe Asp Ser Thr Ser Ser Glu Ile Ile  
545 550 555 560

Ser Trp Ser Asn Thr Lys Ile Ser Val Lys Val Pro Asn Val Ala Gly  
565 570 575

Gly Tyr Tyr Asp Leu Ser Val Val Thr Ala Ala Asn Ile Lys Ser Pro  
580 585 590

Thr Tyr Lys Glu Phe Glu Val Leu Ser Gly Asn Gln Val Ser Val Arg  
595 600 605

Phe Gly Val Asn Asn Ala Thr Thr Ser Pro Gly Thr Asn Leu Tyr Ile  
610 615 620

Val Gly Asn Val Asn Glu Leu Gly Asn Trp Asp Ala Asp Lys Ala Ile  
625 630 635 640

Gly Pro Met Phe Asn Gln Val Met Tyr Gln Tyr Pro Thr Trp Tyr Tyr  
645 650 655

Asp Ile Ser Val Pro Ala Gly Lys Asn Leu Glu Tyr Lys Tyr Ile Lys  
660 665 670

Lys Asp Gln Asn Gly Asn Val Val Trp Gln Ser Gly Asn Asn Arg Thr  
675 680 685

Tyr Thr Ser Pro Thr Thr Gly Thr Asp Thr Val Met Ile Asn Trp  
690 695 700

<210> 15  
<211> 711  
<212> PRT  
<213> *Bacillus stearothermophilus*

<400> 15

Met Arg Arg Trp Leu Ser Leu Val Leu Ser Met Ser Phe Val Phe Ser  
1 5 10 15

Ala Ile Phe Ile Val Ser Asp Thr Gln Lys Val Thr Val Glu Ala Ala  
20 25 30

Gly Asn Leu Asn Lys Val Asn Phe Thr Ser Asp Val Val Tyr Gln Ile  
35 40 45

Val Val Asp Arg Phe Val Asp Gly Asn Thr Ser Asn Asn Pro Ser Gly  
50 55 60

Ala Leu Phe Ser Ser Gly Cys Thr Asn Leu Arg Lys Tyr Cys Gly Gly

65		70		75		80
Asp Trp Gln Gly Ile Ile Asn Lys Ile Asn Asp Gly Tyr Leu Thr Asp	85		90		95	
Met Gly Val Thr Ala Ile Trp Ile Ser Gln Pro Val Glu Asn Val Phe	100		105		110	
Ser Val Met Asn Asp Ala Ser Gly Ser Ala Ser Tyr His Gly Tyr Trp	115		120		125	
Ala Arg Asp Phe Lys Lys Pro Asn Pro Phe Phe Gly Thr Leu Ser Asp	130		135		140	
Phe Gln Arg Leu Val Asp Ala Ala His Ala Lys Gly Ile Lys Val Ile	145		150		155	160
Ile Asp Phe Ala Pro Asn His Thr Ser Pro Ala Ser Glu Thr Asn Pro		165		170		175
Ser Tyr Met Glu Asn Gly Arg Leu Tyr Asp Asn Gly Thr Leu Leu Gly		180		185		190
Gly Tyr Thr Asn Asp Ala Asn Met Tyr Phe His His Asn Gly Gly Thr		195		200		205
Thr Phe Ser Ser Leu Glu Asp Gly Ile Tyr Arg Asn Leu Phe Asp Leu		210		215		220
Ala Asp Leu Asn His Gln Asn Pro Val Ile Asp Arg Tyr Leu Lys Asp	225		230		235	240
Ala Val Lys Met Trp Ile Asp Met Gly Ile Asp Gly Ile Arg Met Asp		245		250		255
Ala Val Lys His Met Pro Phe Gly Trp Gln Lys Ser Leu Met Asp Glu		260		265		270
Ile Asp Asn Tyr Arg Pro Val Phe Thr Phe Gly Glu Trp Phe Leu Ser		275		280		285
Glu Asn Glu Val Asp Ala Asn Asn His Tyr Phe Ala Asn Glu Ser Gly	290		295		300	

Met Ser Leu Leu Asp Phe Arg Phe Gly Gln Lys Leu Arg Gln Val Leu  
305 310 315 320

Arg Asn Asn Ser Asp Asn Trp Tyr Gly Phe Asn Gln Met Ile Gln Asp  
325 330 335

Thr Ala Ser Ala Tyr Asp Glu Val Leu Asp Gln Val Thr Phe Ile Asp  
340 345 350

Asn His Asp Met Asp Arg Phe Met Ile Asp Gly Gly Asp Pro Arg Lys  
355 360 365

Val Asp Met Ala Leu Ala Val Leu Leu Thr Ser Arg Gly Val Pro Asn  
370 375 380

Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Thr Gly Asn Gly Asp Pro Asn  
385 390 395 400

Asn Arg Lys Met Met Ser Ser Phe Asn Lys Asn Thr Arg Ala Tyr Gln  
405 410 415

Val Ile Gln Lys Leu Ser Ser Leu Arg Arg Asn Asn Pro Ala Leu Ala  
420 425 430

Tyr Gly Asp Thr Glu Gln Arg Trp Ile Asn Gly Asp Val Tyr Val Tyr  
435 440 445

Glu Arg Gln Phe Gly Lys Asp Val Val Leu Val Ala Val Asn Arg Ser  
450 455 460

Ser Ser Ser Asn Tyr Ser Ile Thr Gly Leu Phe Thr Ala Leu Pro Ala  
465 470 475 480

Gly Thr Tyr Thr Asp Gln Leu Gly Gly Leu Leu Asp Gly Asn Thr Ile  
485 490 495

Gln Val Gly Ser Asn Gly Ser Val Asn Ala Phe Asp Leu Gly Pro Gly  
500 505 510

Glu Val Gly Val Trp Ala Tyr Ser Ala Thr Glu Ser Thr Pro Ile Ile  
515 520 525



Gly His Val Gly Pro Met Met Gly Gln Val Gly His Gln Val Thr Ile  
530 535 540

Asp Gly Glu Gly Phe Gly Thr Asn Thr Gly Thr Val Lys Phe Gly Thr  
545 550 555 560

Thr Ala Ala Asn Val Val Ser Trp Ser Asn Asn Gln Ile Val Val Ala  
565 570 575

Val Pro Asn Val Ser Pro Gly Lys Tyr Asn Ile Thr Val Gln Ser Ser  
580 585 590

Ser Gly Gln Thr Ser Ala Ala Tyr Asp Asn Phe Glu Val Leu Thr Asn  
595 600 605

Asp Gln Val Ser Val Arg Phe Val Val Asn Asn Ala Thr Thr Asn Leu  
610 615 620

Gly Gln Asn Ile Tyr Ile Val Gly Asn Val Tyr Glu Leu Gly Asn Trp  
625 630 635 640

Asp Thr Ser Lys Ala Ile Gly Pro Met Phe Asn Gln Val Val Tyr Ser  
645 650 655

Tyr Pro Thr Trp Tyr Ile Asp Val Ser Val Pro Glu Gly Lys Thr Ile  
660 665 670

Glu Phe Lys Phe Ile Lys Lys Asp Ser Gln Gly Asn Val Thr Trp Glu  
675 680 685

Ser Gly Ser Asn His Val Tyr Thr Thr Pro Thr Asn Thr Thr Gly Lys  
690 695 700

Ile Ile Val Asp Trp Gln Asn  
705 710

<210> 16  
<211> 655  
<212> PRT  
<213> *Klebsiella pneumoniae*

<400> 16

Met Lys Arg Asn Arg Phe Phe Asn Thr Ser Ala Ala Ile Ala Ile Ser

1	5	10	15
Ile Ala Leu Asn Thr Phe Phe Cys Ser Met Gln Thr Ile Ala Ala Glu	20	25	30
Pro Glu Glu Thr Tyr Leu Asp Phe Arg Lys Glu Thr Ile Tyr Phe Leu	35	40	45
Phe Leu Asp Arg Phe Ser Asp Gly Asp Pro Ser Asn Asn Ala Gly Phe	50	55	60
Asn Ser Ala Thr Tyr Asp Pro Asn Asn Leu Lys Lys Tyr Thr Gly Gly	65	70	75
Asp Leu Arg Gly Leu Ile Asn Lys Leu Pro Tyr Leu Lys Ser Leu Gly	85	90	95
Val Thr Ser Ile Trp Ile Thr Pro Pro Ile Asp Asn Val Asn Asn Thr	100	105	110
Asp Ala Ala Gly Asn Thr Gly Tyr His Gly Tyr Trp Gly Arg Asp Tyr	115	120	125
Phe Arg Ile Asp Glu His Phe Gly Asn Leu Asp Asp Phe Lys Glu Leu	130	135	140
Thr Ser Leu Met His Ser Pro Asp Tyr Asn Met Lys Leu Val Leu Asp	145	150	155
Tyr Ala Pro Asn His Ser Asn Ala Asn Asp Glu Asn Glu Phe Gly Ala	165	170	175
Leu Tyr Arg Asp Gly Val Phe Ile Thr Asp Tyr Pro Thr Asn Val Ala	180	185	190
Ala Asn Thr Gly Trp Tyr His His Asn Gly Gly Val Thr Asn Trp Asn	195	200	205
Asp Phe Phe Gln Val Lys Asn His Asn Leu Phe Asn Leu Ser Asp Leu	210	215	220
Asn Gln Ser Asn Thr Asp Val Tyr Gln Tyr Leu Leu Asp Gly Ser Lys	225	230	235
			240

Phe Trp Ile Asp Ala Gly Val Asp Ala Ile Arg Ile Asp Ala Ile Lys  
245 250 255

His Met Asp Lys Ser Phe Ile Gln Lys Trp Thr Ser Asp Ile Tyr Asp  
260 265 270

Tyr Ser Lys Ser Ile Gly Arg Glu Gly Phe Phe Phe Phe Gly Glu Trp  
275 280 285

Phe Gly Ala Ser Ala Asn Thr Thr Thr Gly Val Asp Gly Asn Ala Ile  
290 295 300

Asp Tyr Ala Asn Thr Ser Gly Ser Ala Leu Leu Asp Phe Gly Phe Arg  
305 310 315 320

Asp Thr Leu Glu Arg Val Leu Val Gly Arg Ser Gly Asn Thr Met Lys  
325 330 335

Thr Leu Asn Ser Tyr Leu Ile Lys Arg Gln Thr Val Phe Thr Ser Asp  
340 345 350

Asp Trp Gln Val Val Phe Met Asp Asn His Asp Met Ala Arg Ile Gly  
355 360 365

Thr Ala Leu Arg Ser Asn Ala Thr Thr Phe Gly Pro Gly Asn Asn Glu  
370 375 380

Thr Gly Gly Ser Gln Ser Glu Ala Phe Ala Gln Lys Arg Ile Asp Leu  
385 390 395 400

Gly Leu Val Ala Thr Met Thr Val Arg Gly Ile Pro Ala Ile Tyr Tyr  
405 410 415

Gly Thr Glu His Tyr Ala Ala Asn Phe Thr Ser Asn Ser Phe Gly Gln  
420 425 430

Val Gly Ser Asp Pro Tyr Asn Arg Glu Lys Met Pro Gly Phe Asp Thr  
435 440 445

Glu Ser Glu Ala Phe Ser Ile Ile Lys Thr Leu Gly Asp Leu Arg Lys  
450 455 460

Ser Ser Pro Ala Ile Gln Asn Gly Thr Tyr Thr Glu Leu Trp Val Asn  
465 470 475 480

Asp Asp Ile Leu Val Phe Glu Arg Arg Ser Gly Asn Asp Ile Val Ile  
485 490 495

Val Ala Leu Asn Arg Gly Glu Ala Asn Thr Ile Asn Val Lys Asn Ile  
500 505 510

Ala Val Pro Asn Gly Val Tyr Pro Ser Leu Ile Gly Asn Asn Ser Val  
515 520 525

Ser Val Ala Asn Lys Arg Thr Thr Leu Thr Leu Met Gln Asn Glu Ala  
530 535 540

Val Val Ile Arg Ser Gln Ser Asp Asp Ala Glu Asn Pro Thr Val Gln  
545 550 555 560

Ser Ile Asn Phe Thr Cys Asn Asn Gly Tyr Thr Ile Ser Gly Gln Ser  
565 570 575

Val Tyr Ile Ile Gly Asn Ile Pro Gln Leu Gly Gly Trp Asp Leu Thr  
580 585 590

Lys Ala Val Lys Ile Ser Pro Thr Gln Tyr Pro Gln Trp Ser Ala Ser  
595 600 605

Leu Glu Leu Pro Ser Asp Leu Asn Val Glu Trp Lys Cys Val Lys Arg  
610 615 620

Asn Glu Thr Asn Pro Thr Ala Asn Val Glu Trp Gln Ser Gly Ala Asn  
625 630 635 640

Asn Gln Phe Asn Ser Asn Asp Thr Gln Thr Thr Asn Gly Ser Phe  
645 650 655

<210> 17

<211> 686

<212> PRT

<213> Bacillus stearothermophilus

<400> 17

Ser Ser Ser Ala Ser Val Lys Gly Asp Val Ile Tyr Gln Ile Ile Ile

1	5	10	15
Asp Arg Phe Tyr Asp Gly Asp Thr Thr Asn Asn Asn Pro Ala Lys Ser	20	25	30
Tyr Gly Leu Tyr Asp Pro Thr Lys Ser Lys Trp Lys Met Tyr Trp Gly	35	40	45
Gly Asp Leu Glu Gly Val Arg Gln Lys Leu Pro Tyr Leu Lys Gln Leu	50	55	60
Gly Val Thr Thr Ile Trp Leu Ser Pro Val Leu Asp Asn Leu Asp Thr	65	70	75
Leu Ala Gly Thr Asp Asn Thr Gly Tyr His Gly Tyr Trp Thr Arg Asp	85	90	95
Phe Lys Gln Ile Glu Glu His Phe Gly Asn Trp Thr Thr Phe Asp Thr	100	105	110
Leu Val Asn Asp Ala His Gln Asn Gly Ile Lys Val Ile Val Asp Phe	115	120	125
Val Pro Asn His Ser Thr Pro Phe Lys Ala Asn Asp Ser Thr Phe Ala	130	135	140
Glu Gly Gly Ala Leu Tyr Asn Asn Gly Thr Tyr Met Gly Asn Tyr Phe	145	150	155
Asp Asp Ala Thr Lys Gly Tyr Phe His His Asn Gly Asp Ile Ser Asn	165	170	175
Trp Asp Asp Arg Tyr Glu Ala Gln Trp Lys Asn Phe Thr Asp Pro Ala	180	185	190
Gly Phe Ser Leu Ala Asp Leu Ser Gln Glu Asn Gly Thr Ile Ala Gln	195	200	205
Tyr Leu Thr Asp Ala Ala Val Gln Leu Val Ala His Gly Ala Asp Gly	210	215	220
Leu Arg Ile Asp Ala Val Lys His Phe Asn Ser Gly Phe Ser Lys Ser	225	230	235
			240

Leu Ala Asp Lys Leu Tyr Gln Lys Lys Asp Ile Phe Leu Val Gly Glu  
245 250 255

Trp Tyr Gly Asp Asp Pro Gly Thr Ala Asn His Leu Glu Lys Val Arg  
260 265 270

Tyr Ala Asn Asn Ser Gly Val Asn Val Leu Asp Phe Asp Leu Asn Thr  
275 280 285

Val Ile Arg Asn Val Phe Gly Thr Phe Thr Gln Thr Met Tyr Asp Leu  
290 295 300

Asn Asn Met Val Asn Gln Thr Gly Asn Glu Tyr Lys Tyr Lys Glu Asn  
305 310 315 320

Leu Ile Thr Phe Ile Asp Asn His Asp Met Ser Arg Phe Leu Ser Val  
325 330 335

Asn Ser Asn Lys Ala Asn Leu His Gln Ala Leu Ala Phe Ile Leu Thr  
340 345 350

Ser Arg Gly Thr Pro Ser Ile Tyr Tyr Gly Thr Glu Gln Tyr Met Ala  
355 360 365

Gly Gly Asn Asp Pro Tyr Asn Arg Gly Met Met Pro Ala Phe Asp Thr  
370 375 380

Thr Thr Thr Ala Phe Lys Glu Val Ser Thr Leu Ala Gly Leu Arg Arg  
385 390 395 400

Asn Asn Ala Ala Ile Gln Tyr Gly Thr Thr Thr Gln Arg Trp Ile Asn  
405 410 415

Asn Asp Val Tyr Ile Tyr Glu Arg Lys Phe Phe Asn Asp Val Val Leu  
420 425 430

Val Ala Ile Asn Arg Asn Thr Gln Ser Ser Tyr Ser Ile Ser Gly Leu  
435 440 445

Gln Thr Ala Leu Pro Asn Gly Ser Tyr Ala Asp Tyr Leu Ser Gly Leu  
450 455 460

Leu Gly Gly Asn Gly Ile Ser Val Ser Asn Gly Ser Val Ala Ser Phe  
465 470 475 480

Thr Leu Ala Pro Gly Ala Val Ser Val Trp Gln Tyr Ser Thr Ser Ala  
485 490 495

Ser Ala Pro Gln Ile Gly Ser Val Ala Pro Asn Met Gly Ile Pro Gly  
500 505 510

Asn Val Val Thr Ile Asp Gly Lys Gly Phe Gly Thr Thr Gln Gly Thr  
515 520 525

Val Thr Phe Gly Gly Val Thr Ala Thr Val Lys Ser Trp Thr Ser Asn  
530 535 540

Arg Ile Glu Val Tyr Val Pro Asn Met Ala Ala Gly Leu Thr Asp Val  
545 550 555 560

Lys Val Thr Ala Gly Gly Val Ser Ser Asn Leu Tyr Ser Tyr Asn Ile  
565 570 575

Leu Ser Gly Thr Gln Thr Ser Val Val Phe Thr Val Lys Ser Ala Pro  
580 585 590

Pro Thr Asn Leu Gly Asp Lys Ile Tyr Leu Thr Gly Asn Ile Pro Glu  
595 600 605

Leu Gly Asn Trp Ser Thr Asp Thr Ser Gly Ala Val Asn Asn Ala Gln  
610 615 620

Gly Pro Leu Leu Ala Pro Asn Tyr Pro Asp Trp Phe Tyr Val Phe Ser  
625 630 635 640

Val Pro Ala Gly Lys Thr Ile Gln Phe Lys Phe Phe Ile Lys Arg Ala  
645 650 655

Asp Gly Thr Ile Gln Trp Glu Asn Gly Ser Asn His Val Ala Thr Thr  
660 665 670

Pro Thr Gly Ala Thr Gly Asn Ile Thr Val Thr Trp Gln Asn  
675 680 685

<210> 18  
<211> 7  
<212> PRT  
<213> Artificial sequence

<220>  
<223> Variant

<400> 18

Thr Leu Ala Gly Thr Asp Asn  
1 5

<210> 19  
<211> 11  
<212> PRT  
<213> Artificial sequence

<220>  
<223> Variant

<400> 19

Tyr Gly Asp Asp Pro Gly Thr Ala Asn His Leu  
1 5 10

<210> 20  
<211> 12  
<212> PRT  
<213> Artificial sequence

<220>  
<223> Variant

<400> 20

Tyr Gly Asp Asp Pro Gly Thr Ala Asn His Leu Glu  
1 5 10